ABSTRACT

A plasma etching machine comprises a process chamber defining an interior region and including a bottom wall having an aperture and a block disposed in the aperture and including a longitudinally extending bore. A shaft extends through the bore and includes a spider push rod extending longitudinally therethrough. The shaft is supported for rotation in the bore. An internally cooled chuck is coupled to the shaft and disposed in the interior region and cooperates with the shaft to define a chamber. A spider is disposed in the chamber and is coupled to the spider push rod. A lift mechanism is coupled to the shaft and the spider push rod so that the spider pushes up on a wafer in response to actuation of the lift mechanism. A wafer clamping mechanism is coupled to the spider push rods if a mechanical clamp is used. In the case of electrostatic clamp the bias applied to the chuck is coupled with the use of a rotational roller to allow the bias to be applied to the chuck for the duration of the etch process. A RF source is needed for ionization of the gas. If the plasma etching machine has RF power applied through the bottom, then a rotational roller is used for this as well and must be isolated from the electrostatic voltage used to clamp the wafer. A drive motor is coupled to the shaft for rotating the shaft during a plasma etching process. A bellows assembly is coupled to the shaft and to a coolant source. The lift mechanism includes a lift

plate coupled to the bellows assembly, the lift plate and bellows assembly being movable between a wafer lifting position and a disengaged position, the spider push rod including a coolant passage in communication with the chamber and being movable in response to movement of the lift plate and bellows assembly.